THE WRITINGS OF BENJAMIN FRANKLIN PERTAINING TO MEDICINE AND THE MEDICAL PROFESSION.

(Continued.)

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THE PENNSYLVANIA HOSPITAL.

Franklin helped found not only the first hospital, but also the first medical school in America; and if he had no other claim upon us, he should be forever highly honored by the American Medical Profession.

Franklin's account of the founding of the Pennsylvania Hospital, taken from his autobiography, at once challenges our interest and admiration. The successful method of raising funds for America's first hospital devised by Franklin has been copied by many hospital managers in the succeeding generations down to this day.

"In 1751, Dr. Thomas Bond, a particular friend of mine, conceived the idea of establishing a hospital in Philadelphia (a very beneficent design, which has been ascrib'd to me, but was originally his), for the reception and cure of poor sick persons, whether inhabitants of the province or strangers. He was zealous and active in endeavoring to procure subscriptions for it, but the proposal being a novelty, in America, and at first not well understood, he met with but small success.

"At length he came to me with the compliment that he found there was no such thing as carrying a public-spirited project through without my being concerned in it. 'For,' says he, 'I am often ask'd by those to whom I propose subscribing, "Have you consulted Franklin upon this business?" And when I tell them that I have not (supposing it rather out of your line) they do not subscribe, but say they will consider of it.' I inquired into the nature and probable utility of his scheme, and receiving from him a very satisfactory explanation, I not only subscribed to it myself, but engaged heartily in the design of procuring subscriptions from others. Previously, however, to the solicitation, I endeavored to prepare the minds of the people by writing on the subject in the newspapers, which was my usual custom in such cases, but which he had omitted.

"The subscriptions afterwards were more free and generous; but beginning to flag, I saw they would be insufficient without some assistance from the Assembly, and therefore proposed to petition for it, which was done. The country members did not at first relish the project; they objected that it could only be serviceable in the city, and therefore the citizens themselves should be at the expense of it; and they doubted whether the citizens themselves approved of it. My allegation on the contrary, that it met with such approbation as to leave no doubt of our being able to raise two thousand pounds by voluntary donations, they considered as a most extravagant supposition, and utterly impossible.

"On this I formed my plan; and, asking leave to bring a bill for incorporating the contributors according to the prayer of their petition and granting them a blank sum of money, which leave was obtained chiefly on the consideration that the House could throw the bill out if they did not like it, I drew it so as to make the important clause a conditional one, *viz.:* And be it enacted, by the authority aforesaid, that when the said contributors shall have met and chosen their managers and treasurer, *and shall have raised by their contributions a capital stock of* —— *—value* (the yearly interest of which is to be applied to the accommodating of the sick poor in the said hospital, free of charge for diet, attendance, advice, and medicine), *and shall make the same appear to the satisfaction of the speaker of the Assembly for the time being,* that *then* it shall and may be lawful for the said speaker, and he is hereby required, to sign an order on the provincial treasurer for the payment of two thousand pounds, in two yearly payments, to the treasurer of the said hospital, to be applied to the founding, building, and finishing of the same).

"This condition carried the bill through; for the members, who had opposed the grant, now conceived they might have the credit of being charitable without the expense, agreed to its passage, and then, in soliciting the subscriptions among the people, we urged the conditional promise of the law as an additional motive to give, since every man's donation would be doubled; thus the clause worked both ways. The subscriptions accordingly soon exceeded the requisite sum, and we claimed and received the public gift, which enabled us to carry the design into execution. A convenient and handsome building was soon erected; the institution has by constant experience been found

useful, and flourishes to this day; and I do not remember any of my political manœuvres, the success of which gave me at the time more pleasure, or wherein, after thinking of it, I more easily excused myself for having made some use of cunning."

Although the idea of founding the Pennsylvania Hospital originated with Dr. Thomas Bond, to whom should be given full credit, yet, without the active interest and aid of Franklin, it is unlikely that the hospital would have been built at that time. The petition to the Assembly of Pennsylvania was drawn up by Franklin. The first President of the Board of Managers was Joshua Crosby; and Benjamin Franklin filled the office of clerk. Upon the death of Mr. Crosby, in 1754, Franklin succeeded him as President of the Board of Managers. The design for the seal for the hospital was devised by Franklin and Dr. Thomas Bond. The inscription for the corner-stone for the hospital was written by Franklin and reads as follows:

IN THE YEAR OF CHRIST
MDCCLV
GEORGE THE SECOND HAPPILY REIGNING
(FOR HE SOUGHT THE HAPPINESS OF HIS PEOPLE)
PHILADELPHIA FLOURISHING
(FOR ITS INHABITANTS WERE PUBLICK SPIRITED)
THIS BUILDING
BY THE BOUNTY OF THE GOVERNMENT,
AND OF MANY PRIVATE PERSONS,
WAS PIOUSLY FOUNDED,
FOR THE RELIEF OF THE SICK AND MISERABLE;
MAY THE GOD OF MERCIES
BLESS THE UNDERTAKING.

FRANKLIN'S CONNECTION WITH THE FIRST MEDICAL SCHOOL IN AMERICA, AFTERWARDS THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF PENNSYLVANIA.

The College of Philadelphia, which had been founded by Franklin, organized its medical department through the efforts of Drs. John Morgan and William Shippen, in 1766, when systematic lectures were begun in this the first medical school in the United States. The first commencement of the Medical Department of the College of Philadelphia was held in 1768. Later dissensions occurred, and on November 27, 1779, the Legislature repealed the charter of the College of Philadelphia and conferred all the powers and privileges which it had enjoyed upon "The

University of the State of Pennsylvania." The friends of the College were very much displeased by this action and worked steadily and persistently for the repeal of the bill. They finally succeeded, and on March 6, 1783, the old college charter again became operative. "Benjamin Franklin was in the forefront of those who fought for the rights of the College. He had been in Europe at the time the bill constituting the University had been passed. The founders of the University had taken the liberty of making him one of its trustees, but immediately on his return he had withdrawn his name and joined with his old colleagues of the College." (Packard.)

On November 17, 1789, the trustees of the College, of which Franklin was now President, published a set of rules governing the conferring of medical degrees.

FRANKLIN'S RULES OF HEALTH; WITH SOME ACCOUNT OF HIS OWN HEALTH.

Franklin states that his father "had an excellent constitution of the body," and that "I never knew either my father or mother to have any sickness but that of which they dy'd, he at 89, and she at 85 years of age."

Franklin must, therefore, have inherited his splendid constitution from his parents, without which his career could have been neither so long nor so glorious.

He inculcated the habit of moderation in eating and drinking, and warned against free indulgence of alcoholic drinks at a very early age. When sixteen years of age, he wrote in the *New England Courant* the following lines on drinking:

"I doubt not but *moderate* drinking has been improved for the Diffusion of Knowledge among the ingenious Part of Mankind, who want the Talent of a ready Utterance, in order to discover the Conception of their Minds in an entertaining and intelligible Manner. 'Tis true, drinking does not improve our Faculties, but it enables us to use them, and therefore, I conclude, that much Study and Experience, and a little Liquor are of absolute necessity for some tempers, in order to make them accomplished Orators."

It was about this time that he became a vegetarian, a practice which he followed up after he left Boston and became a resident of Philadelphia. Of this he tells us in his autobiography from which I quote.

"When about sixteen years of age I happened to meet with a book, written by one Tryon, recommending a vegetable diet. I determined to go into it. My brother, being yet unmarried, did not keep house, but boarded himself and his apprentices in another family. My refusing to eat flesh occasioned an inconveniency, and I was frequently chid for my singularity. I made myself acquainted with Tryon's manner of preparing some of his dishes, such as boiling potatoes or rice, making hasty pudding, and a few others, and then proposed to my brother, that if he would give me, weekly, half the money he paid for my board, I would board myself. He instantly agreed to it, and I presently found that I could save half what he paid me. This was an additional fund for buying books.

"I believe I have omitted mentioning that, in my first voyage from Boston, being becalm'd off Block Island, our people set about catching cod, and hauled up a good many. Hitherto I had stuck to my resolution of not eating animal food, and on this occasion I consider'd with my master Tryon, the taking every fish as a kind of unprovoked murder, since none of them had or ever could do us any injury that might justify the slaughter. All this seemed very reasonable. But I had formerly been a great lover of fish, and, when this came hot out of the frying-pan, it smelt admirably well. I balanced sometime between principle and inclination, till I recollected that, when the fish were opened, I saw smaller fish taken out of their stomachs; then thought I, 'If you eat one another, I don't see why we mayn't eat you.' So I din'd upon cod very heartily, and continued to eat with other people, returning only now and then occasionally to a vegetable diet. So convenient a thing it is to be a *reasonable creature,* since it enables one to find or make a reason for every thing one has a mind to do.

"Keimer wore his beard at full length, because somewhere in the Mosaic law it is said, 'Thou shalt not mar the corners of thy beard.' He likewise kept the Seventh day, Sabbath; and these two points were essentials with him. I disliked both; but agreed to admit them upon condition of his adopting the doctrine of using no animal food. 'I doubt,' said he, 'my constitution will not bear that.' I assured him it would, and that he would be better for it. He was usually a great glutton, and I promised myself some diversion in half starving him. He agreed to try the practice, if I would keep him company. I did so, and we

held it for three months. We had our victuals dress'd and brought to us by a woman in the neighborhood, who had from me a list of forty dishes, to be prepar'd for us at different times, in all which there was neither fish, flesh nor fowl, and the whim suited me the better at this time from the cheapness of it, not costing us above eighteen pence sterling each per week. I have since kept several Lents most strictly, leaving the common diet for that, and that for the common, abruptly, without the least inconvenience, so that I think there is little in the advice of making those changes by easy gradations. I went on pleasantly, but poor Keimer suffered grievously, tired of the project, longed for the flesh-pots of Egypt, and order'd a roast pig. He invited me and two women friends to dine with him; but, it being brought too soon upon the table, he could not resist the temptation, and ate the whole before we came."

Writing of his first sojourn in London, when he worked there as a printer, Franklin makes these observations in his autobiography:

"At my first admission into this printing-house I took to working at press, imagining I felt a want of bodily exercise I had been us'd to in America, where presswork is mixed with composing. I drank only water; the other workmen, near fifty in number, were great guzzlers of beer. On occasion, I carried up and down stairs a large form of types in each hand, when others carried but one in both hands. They wondered to see, from this and several instances, that the Water-American, as they called me, was stronger than themselves, who drank strong beer! We had an alehouse boy who attended always in the house to supply the workmen. My companion at the press drank every day a pint before breakfast, a pint at breakfast with his bread and cheese, a pint at dinner, a pint in the afternoon about six o'clock, and another when he had done his day's work. I thought it a detestable custom; but it was necessary, he supposed, to drink strong beer that he might be *strong* to labor. I endeavoured to convince him that the bodily strength afforded by beer could only be in proportion to the grain of flour of the barley dissolved in the water of which it was made; and that there was more flour in a pennyworth of bread; and therefore, if he would eat that with a pint of water, it would give him more strength than a quart of beer. He drank on, however, and had four or five shillings to pay out of his wages every Saturday night for that

muddling liquor; an expense I was free from. And thus these poor devils keep themselves always under." While working as a printer in London he tells us that "Our supper was only half an anchovy each, on a very little strip of bread and butter, half a pint of ale between us." The object of this economical fare was really to save money with which to buy books rather than for hygienic reasons.

Franklin approved of water used internally and also externally. Swimming, he held, was one of the most healthful and agreeable exercises in the world and a remedy for diarrhœa. He strongly advocated warm baths, "for cleanliness and purifying the skin"; and he states, "I speak from my own experience, and that of others, to whom I have recommended this."

In 1735 he suffered from some ailment characterized by suppuration from the lungs. Just prior to this time, he thought he had avoided an illness by drinking very freely of cold water and by sweating himself. This treatment is interesting, for at that time and for years afterward it was the practice to forbid fever patients water.

To relieve some skin affection of which he began to suffer in 1778, he states, "I took a hot bath twice a week, two hours at a time." He assures us that he derived great benefit from this prolonged bathing and suffered afterwards by neglecting to take them. Some years later, he took a daily prolonged warm bath in a copper vessel shaped like a slipper. Cutler states he would sit in the heel of this vessel with his legs under the vamp, while on the instep he had fixed a place for his books so that he might read while in the bath.

Franklin's early advocacy of the free use of water internally and externally, including the use of the prolonged warm bath, seems very remarkable in view of some of the later developments in medical practice. The prolonged warm bath in skin affections and as a sedative for the various pyschoses seems to us very modern; and it is only a very few years since the bath has become the chief therapeutic agent in the treatment of typhoid and other fevers.

Franklin, too, was a strong advocate of fresh air, as will be seen later.

He argued against the use of tobacco and never indulged in it. Although very temperate in the use of alcoholic liquors in

his earlier life, he appears to have grown rather indulgent in this respect as he grew older.

Franklin formulated the following hygienic and dietetic rules when he published "Poor Richard."

Rules of Health and Long Life, and to Preserve from Malignant Fevers, and Sickness in General.

"Eat and drink such an exact quantity as the constitution of thy body allows of, in reference to the service of the mind.

"They that study much, ought not to eat so much as those that work hard, their digestion being not so good.

"The exact quantity and quality being found out, is to be kept to constantly.

"Excess in all other things whatever, as well as in meat and drink, is also to be avoided.

"Youth, age and sick require a different quantity.

"And so do those contrary complexions; for that which is too much for a flegmatick man, is not sufficient for a cholerick.

"The measure of food ought to be (as much as possibly may be) exactly proportionable to the quality and condition of the stomach, because the stomach digests it.

"That quantity that is sufficient, the stomach can perfectly concoct and digest, and it sufficeth the due nourishment of the body.

"A greater quantity of some things may be eaten than of others, some being of lighter digestion than others.

"The difficulty lies, in finding out an exact measure; but eat for necessity, not pleasure, for lust knows not where necessity ends.

"Would'st thou enjoy a long life, a healthy body, and a vigorous mind, and be acquainted also with the wonderful works of God? Labor in the first place to bring thy appetite into subjection to reason."

Rules to Find Out a Fit Measure of Meat and Drink.

"If thou eatest so much as makes thee unfit for study, or other business, thou exceedest the due measure.

"If thou art dull and heavy after meat, it's a sign thou hast exceeded the due measure; for meat and drink ought to refresh the body, and make it cheerful, and not to dull and oppress it.

"If thou findest these ill symptoms, consider whether too

much meat, or too much drink occasions it, or both, and abate by little and little, till thou findest the inconveniency removed.

"Keep out of the sight of feasts and banquets as much as may be; for 'tis more difficult to refrain good cheer when it's present, than from the desire of it when it is away; and like you may observe in the objects of all the other senses.

"If a man casually exceeds, let him fast the next meal, and all may be well again, provided it be not too often done; as if he exceed at dinner, let him refrain at supper, etc.

"A temperate diet frees from diseases; such are seldom ill, but if they are surprised with a sickness, they bear it better, and recover sooner; for most distempers have their original from repletion.

"Use now and then, a little exercise a quarter of an hour before each meal, as to swing your arms about with a small weight in each hand; to leap, or the like, for that stirs the muscles of the breast.

"A temperate diet arms the body against all external accidents; so that they are not so easily hurt by heat, cold or labor; if they at any time should be prejudiced, they are more easily cured, either of wounds, dislocations, or bruises.

"But when malignant fevers are rife in the country or city where thou dwelst, 'tis advisable to eat and drink more freely, by way of prevention, for these diseases that are not caused by repletion, and seldom attack full-feeders.

"A sober diet makes a man die without pain; it maintains the senses in vigor; it mitigates the violence of passions and affections.

"It preserves the memory, it helps the understanding, it allays the heat of lust; it brings a man to a consideration of his latter end; it makes the body a fit tabernacle for the Lord to dwell in; which makes us happy in this world, and eternally happy in the world to come, through Jesus Christ our Lord and Saviour."

Writing to his son William from London, on August 19, 1772, Franklin discusses, in a most interesting way, the value of exercise.

"In yours of May 14th, you acquaint me with your indisposition, which gave me great concern. The resolution you have taken to use more exercise is extremely proper; and I hope you will steadily perform it. It is of the greatest importance to pre-

vent diseases, since the cure of them by physic is so very precarious.

"In consideration of the different kinds of exercise, I have thought, that the *quantum* of each is to be judged of, not by time or distance, but by the degree of warmth it produces in the body. Thus, when I observe, if I am cold when I get into a carriage in a morning, I may ride all day without being warmed by it; that, if on horseback, my feet are cold, I may ride some hours before they become warm; but if I am ever so cold on foot, I cannot walk an hour briskly, without glowing from head to foot by the quickened circulation, I have been ready to say (using round numbers without regard to exactness, but merely to mark a great difference) that there is more exercise in *one* mile's riding on horseback, than in *five* in a coach; and more in *one* mile's walking on foot, than *five* on horseback; to which I may add, that there is more in walking *one* mile up and down stairs, than in *five* on a level floor. The two latter exercises may be had within doors when the weather discourages going abroad; and the last may be had when one is pinched for time, as containing a great quantity of exercise of the latter compendious kind. By use of it I have in forty swings quickened my pulse from sixty to a hundred beats in a minute, counted by a second watch; and I suppose the warmth generally increases with quickness of pulse."

As Franklin grew older he relaxed many of the excellent hygienic and dietetic rules by which he had been governed in his early life. Indeed, he himself often violated the maxims which were inculcated by "Poor Richard."

That he grew to appreciate the pleasures of the table may be seen by the following remark he once made:

"Many people are fond of accounts of old buildings and monuments, but for one, I confess that if I could find in any Italian travels a receipt for making Parmesan cheese it would give me more satisfaction than a transcript of any inscription from any old stone whatever."

In 1757 he referred to himself as "Dr. Fatsides," and even before this he admits to "a little natural indolence." "In 1778, Adams writes to me that he 'loves his Ease, hates to offend, and seldom gives any opinion until obliged to do so.' "

Later in his life he writes of himself: "For my own part," he says, "everything of difficult discussion, and that requires close attention of mind and an application of long continuance,

grows irksome to me, and where there is not some absolute necessity for it, as in the settlement of accounts, or the like, I am apt to indulge the indolence usually attending age, in postponing such business from time to time; though continually resolving to do it." For a time Franklin combatted this tendency, but soon again relapsed into his old habits.

In 1727 Franklin was taken down with his first illness, a pleurisy, which he tells us nearly carried him off. While convalescing he regretted "that I must now, sometime or other, have all that disagreeable work to do over."

In 1749 Franklin began to suffer from the gout, which troubled him at intervals during the remainder of his life. The attacks were at first not serious; and once for a period of five years he was free from attacks.

He wrote his wife from London, December 21, 1768: "Walking a great deal tires me less than it used to do. I feel stronger and more active. Yet I would not have you think that I fancy I shall grow young again. I know that according to the Course of Nature I cannot at most continue much longer, and that the living even of another Day is uncertain. I therefore now form no Schemes, but such as are of immediate Execution; indulging myself in no future Prospect except one, that of returning to Philadelphia, there to spend the Evening of Life with my Friends and Family." Again on June 10, 1760:

"On Friday came on a Fit of the Gout, from which I had been free Five Years. Immediately the Inflammation and Swelling in my throat disappeared; my foot swelled greatly, and I was confined about three Weeks; since which I am perfectly well, the Giddiness and every other disagreeable symptom having quite left me." Again on May 5, 1772:

"I thank you for your Advice about putting back a Fit of the Gout. I shall never attempt such a Thing. Indeed, I have not much occasion to complain of the Gout, having had but two slight Fits since I came last to England."

Writing to General Washington from Philadelphia, on June 21, 1776, Franklin says: "I am just recovering from a severe Fit of the Gout which has kept me from Congress almost ever since you left us, so that I know little of what has pass'd there, except that a Declaration of Independence is preparing."

In Franklin's well-known dialogues between himself and the gout was a humorous note to Madame Brillon. There is much

besides humor in the dialogue. It clearly indicates Franklin's appreciation of the conservative and corrective value of diseases. In spite of his suffering he was able to recognize that the pains of the gout were not an unmixed evil.

In 1779, while at the court of France, a serious seizure of gout interfered with his diplomatic duties.

Franklin's account of his treatment of the gout is worth quoting:

"I forgot to acquaint you," he told his friend, Dr. Small, "that I had treated it (my gout) a little cavalierly in its last accesses. Finding one night that my foot gave me more pain after it was covered warm in bed, I put it out of bed naked; and perceiving it easier, I let it remain longer than I had at first designed, and at length fell asleep, leaving it there till morning. The pain did not return, and I grew well. Next winter, having a second attack, I repeated the experiment; not with such immediate success in dismissing the gout, but constantly with the effect of rendering it less painful, so that it permitted me to sleep every night. I should mention that it was my son who gave me the first intimation of this practice. He being in the old opinion, that the gout was to be drawn out by transpiration; and having heard me say, that perspiration was carried on more copiously when the body was naked than when clothed, he put his foot out of bed to increase that discharge, and found ease by it, which he thought a confirmation of the doctrine. But this method requires to be confirmed by more experiments before one can conscientiously recommend it."

Franklin complained of his eyesight as early as 1755. In 1776 he devised a pair of spectacles for himself, each glass containing two lenses joined together by a horizontal line in the center. The upper lense for distance and the lower one for near vision.

The following extracts from a letter written to his wife, dated London, Nov. 22, 1757, giving an account of his illness, his behavior as a patient, etc., are of interest:

"MY DEAR CHILD:

"During my illness, which continued near eight weeks, I wrote you several little letters, as I was able. The last was by the packet which sailed from Falmouth above a week since. In that I informed you, that my intermittent fever, which had continued to harass me, by frequent relapses, was gone off, and I had ever

since been gathering strength and flesh. My doctor, Fothergill, who had forbid me the use of pen and ink, now permits me to write as much as I can without over-fatiguing myself, and therefore I sit down to write more fully than I have hitherto been able to do.

"The second of September I wrote to you that I had had a violent cold and something of a fever, but that it was almost gone. However, it was not long before I had another severe cold, which continued longer than the first, attended by great pain in my head, the top of which was very hot, and when the pain went off, very sore and tender. These fits of pain continued sometimes longer than at others; seldom less than 12 hours, and once 36 hours. I was now and then a little delirious: they cupped me on the back of the head, which seemed to ease me for the present; I took a great deal of bark, both in substance and infusion, and too soon thinking myself well, I ventured out twice, to do a little business and forward the service I am engaged in, and both times got fresh cold and fell again; my good doctor grew very angry with me for acting contrary to his cautions and directions, and obliged me to promise more observance for the future. He attended me very carefully and affectionately; and the good lady of the house nursed me kindly; Billy was also of great service to me, in going from place to place, where I could not go myself, and Peter was very diligent and attentive. I took so much bark in various ways that I began to abhor it; I durst not take a vomit, for fear of my head; but at last I was seized one morning with a vomiting and purging, the latter of which continued the greater part of the day, and I believe was a kind of crisis to the distemper, carrying it clear off; for ever since I feel quite lightsome, and am every day gathering strength; so I hope my seasoning is over, and that I shall enjoy better health during the rest of my stay in England.

"It is now twelve days since I began to write this letter, and I still continue well, but have not yet quite recovered my strength, flesh, or spirits. I every day drink a glass of infusion of bark in wine, by way of prevention, and hope my fever will no more return; on fair days, which are but few, I venture out about noon. The agreeable conversation I meet with among men of learning, and the notice taken of me by persons of distinction, are the principal things that soothe me for the present, under this painful absence from my family and friends. Yet those

would not keep me here another week, if I had not other inducements; duty to my country, and hopes of being able to do it service."

As is well known, Franklin suffered stone in the bladder for many years, which was very painful during the last few years of his life. It appears that he first became aware that he had a stone in 1783, when he was seventy-seven years of age. Concerning the stone he wrote to John Jay:

"It is true, as you have heard, that I have the stone, but not that I had thoughts of being cut for it. It is as yet very tolerable. It gives me no pain but when in a carriage on the pavement, or when I make some sudden quick movement. If I can prevent its growing larger, which I hope to do by abstemious living and gentle exercise; I can go on pretty comfortably with it to the end of my journey, which can now be at no great distance. I am cheerful, enjoy the company of my friends, sleep well, have sufficient appetite, and my stomach performs well its functions. The latter is very material to the preservation of health. I therefore take no drugs lest I should disorder it. You may judge that my disease is not very grievous, since I am more afraid of the medicines than the malady."

Franklin also suffered from a cutaneous affection of which he writes in several letters.

"To-morrow I set out with my friend, Dr. Pringle (Sir John), on a journey to Pyrmont, where he goes to drink the waters; but I hope more for the air and the exercise, having been used, as you know, to have a journey once a year, the want of which last year has, I believe, hurt me, so that, though I was not quite to say sick, I was often ailing last Winter, and through the Spring." He comments upon a skin affection with which he was now troubled, noting that it appeared after eating freely of beef, and sometimes after a long confinement of writing with little exercise and which he was told was scorbutic. In 1773, he placed himself under the care of his good friend, Sir John Pringle, on account of a scab or scurf about the head. Sir John ordered a mercurial wash and a physic. Franklin states, "It slowly left that place, but appeared in other parts of my head." The physician also advised abstinence from salt meat and cheese, which advice Franklin "didn't much follow, often forgetting it."

He complained during his attendance upon Congress of frequent attacks of dizziness. He suffered also from a number of

large boils about this time. In 1776, when seventy years of age, Franklin wrote from Paris where he had lately taken up his residence:

"I lived chiefly on salt beef, the fowls being too hard for my teeth. But, being poorly nourished, I was very weak at my arrival; boils continued to vex me, and the scurf extending over all the small of my back, on my sides, my legs, and my arms, besides what continued under my hair. I applied to a physician, who ordered me Mr. Bellosto's pills and an infusion of a root called ——. I took the infusion a while, but it being disagreeable, and finding no effect, I omitted it. I continued to take the pills, but finding my teeth loosening, and that I had lost three, I desisted the use of them. I found that bathing stopped the progress of the disorder. I therefore took the hot bath twice a week, two hours at a time, till this last summer. It always made me feel comfortable, as I rubbed off the softened scurf in the warm water; and I otherwise enjoyed exceeding good health. I stated my case to Dr. Ingenhousz, and desired him to show it to Sir J. P., and obtain his advice. They sent me from London some medicine, but Dr. Ingenhousz proposing to come over soon, and the affair not pressing, I resolved to omit the medicine till his arrival."

It is interesting to note in this account that the loosening of the teeth of which Franklin complained, was probably due to salivation. Dr. Franklin's own efforts, with those of Dr. Ingenhousz and Sir John Pringle, to combat the disease are all matters of interest to physicians.

In 1779 Dr. Franklin wrote to a friend: "I can give you no good account. I have a long time been afflicted with almost constant and grievous pain, to combat which I have been obliged to have recourse to opium, which indeed has afforded me some ease from time to time, but then it has taken away my appetite and so impeded my digestion that I am become totally emaciated, and little remains of me but a skeleton covered with a skin."

When an old man and reflecting on his past life and his bodily ailments, Franklin writes: "One means of becoming content with one's situation is the comparing it with a worse. Thus, when I consider how many terrible diseases the human body is liable to, I comfort myself that only three incurable ones have fallen to my share, viz.: the gout, the stone, and old age; and these have

not yet deprived me of my natural cheerfulness, my delight in books, and my enjoyment of social conversation."

When the time arrived for him to leave France, in 1783, he was so infirm by reason of the gout and the stone that it became a question as to whether he could make the voyage. Marie Antoinette came to his rescue with an offer of a litter, carried by means of large mules. It was in this fashion that the great philosopher made his wonderful, triumphal march from Paris to the seaboard, where he embarked for home.

After his arrival in Philadelphia he had to be carried to the State House in a litter. He was a member of the Federal Convention. All his speeches were read by his colleague, Joseph Wilson, as Franklin was unable to stand on his feet.

In a letter to Dr. Ingenhousz, dated Philadelphia, October 24, 1788, Franklin writes:

"You have always been kind enough to interest yourself in what relates to my health. I ought therefore to acquaint you with what appears to me something curious respecting it. You may remember the cutaneous malady, I formerly complained of, and which you and Dr. Pringle favored me with prescriptions and advice. It vexed me near fourteen years, and was, the beginning of this year, as bad as ever, covering almost my whole body, except my face and hands; when a fit of the gout came on, without very much pain, but a swelling in both feet, which at last appeared also in both knees, and then in my hands. As these swellings increased and extended, the other malady diminished, and at length disappeared entirely. These swellings have sometimes since begun to fall, and are now almost gone; perhaps the cutaneous disease may return, or perhaps it is worn out. I may hereafter let you know what happens. I am on the whole much weaker than when it began to leave me. But possibly that may be the effect of age, for I am now near eighty-three, the age of commencing decrepitude."

Dr. John Jones, his attending physician, has thus written of Franklin's last illness:

"The stone, with which he had been afflicted for several years, had for the last twelve months confined him chiefly to his bed; and during the extremely painful paroxysms he was obliged to take large doses of laudanum to mitigate his torture; still, in the intervals of pain, he not only amused himself with reading and conversing cheerfully with his family, and a few friends who

visited him, but was often employed in doing business of a public as well as private nature, with various persons who waited on him for that purpose; and in every instance displayed not only that readiness and disposition of doing good which was the distinguishing characteristic of his life, but the fullest and clearest possession of his uncommon mental abilities; and not unfrequently indulged himself in those *'jeux d'esprit'* and entertaining anecdotes, which were the delight of all who heard him. About sixteen days before his death he was seized with a feverish indisposition, without any particular symptoms attending it, till the third or fourth day, when he complained of a pain in the left breast, which increased till it became extremely acute, attended with a cough and laborious breathing. During this state when the severity of his pain drew forth a groan of complaint, he would observe—that he was afraid he did not bear them as he ought—acknowledged his grateful sense of the many blessings he had received from that Supreme Being, who had raised him from small and low beginnings to such high rank and consideration among men—and made no doubt but his afflictions were kindly intended to wean him from a world in which he was no longer fit to act the part assigned him. In this frame of body and mind he continued till five days before his death, when his pain and difficulty of breathing entirely left him, and his family were flattering themselves with the hopes of his recovery, when an imposthumation, which had formed itself in his lungs, suddenly burst and discharged a great quantity of matter, which he continued to throw up while he had sufficient strength to do it; but, as that failed, the organs of respiration became gradually oppressed—a calm lethargic state succeeded—and, on the 17th of April, 1790, about eleven o'clock at night, he quietly expired, closing a long and useful life of eighty-four years and three months."

Dr. Rush wrote to Dr. Price:

"The papers will inform you of the death of our late friend, Dr. Franklin. The evening of his life was marked by the same activity of his moral and intellectual powers which distinguished its meridian. His conversation with his family upon the subject of his dissolution was free and cheerful. A few days before he died, he rose from his bed and begged that it might be made up for him so *that he might die in a decent manner.* His daughter told him she hoped he would recover and live many years longer. He calmly replied, 'I hope not.' Upon being advised to change

his position in bed, that he might breathe easy, he said, 'A dying man can do nothing easy.' All orders and bodies of people have vied with each other in paying tributes of respect to his memory."

FRANKLIN AS A MEDICAL BOOK PUBLISHER.

In days when but very few works on medicine were written in America, Franklin deserves mention as a medical book publisher of note. Among the works which he published or reprinted are the following:

In 1732 he reprinted a book originally published in London, dealing with "The Horror of the Gout," which set forth that the disease is "one of the greatest Blessings which can befall mortal man."

In 1734 he published a new edition of a book written by John Tennent entitled, "Every man his own Doctor; or the Poor Planter's Physician."

In 1741 Franklin printed the work of his friend, Dr. Cadwallader Colden, of New York, entitled "Essay on the Iliac Passion."

In 1751 he printed two medical essays, one by Dr. John Kearsley and the other, "Medicina Britannica," by Dr. Thomas Short.

In 1754 he wrote and printed a paper entitled "Some Account of the Pennsylvania Hospital—from its First Rise, the Beginning of the Fifth Month, called May, 1754," and which was circulated for the purpose of procuring subscriptions for the hospital.

SWIMMING AND BATHING.

Referring to his first visit to London when he worked there as a young apprentice, Franklin writes:

"At Watt's printing house I contracted an acquaintance with an ingenious young man, one Wygate, who, having wealthy relations, had been better educated than most printers; was a tolerable Latinist, spoke French, and loved reading. I taught him and a friend of his to swim at twice going into the river, and they soon became good swimmers. They introduced me to some gentlemen from the country, who went to Chelsea by water to see the College and Don Saltero's curiosities. In our return, at the request of the company, whose curiosity Wygate had excited, I stripped and leaped into the river, and swam from near Chelsea to Blackfryar's, performing on the way many feats of activity, both upon and under

the water, that surprised and pleased those to whom they were novelties.

"I had from a child ever delighted with this exercise, had studied and practised all Thevenot's motions and positions, added some of my own, aiming at the graceful and easy as well as the useful. All these I took this occasion of exhibiting to the company, and was much flattered by their admiration; and Wygate, who was desirous of becoming a master, grew more and more attached to me on that account, as well as from the similarity of our studies. He at length proposed to me traveling all over Europe together, supporting ourselves everywhere by working at our business. I was once inclined to it; but, mentioning it to my good friend, Mr. Denham, with whom I often spent an hour when I had leisure, he disuaded me from it, advising me to think only of returning to Pennsylvania, which he was now about to do.

"On one of these days, I was, to my surprise, sent for by a great man I knew only by name, a Sir William Wyndham, and I waited upon him. He had heard by some means or other of my swimming from Chelsea to Blackfriar's, and of my teaching Wygate and another young man to swim in a few hours. He had two sons, about to set out on their travels; he wished to have them taught swimming, and proposed to gratify me handsomely if I would teach them. They were not yet come to town, and my stay was uncertain, so I could not undertake it; but from this incident I thought it likely that, if I were to remain in England and open a swimming school, I might get a good deal of money; and it struck me so strongly, that, had the overture been made sooner, probably I should not so soon have returned to America. After many years, you and I had something of more importance to do with one of these sons of Sir William Wyndham, become Earl of Egremont, which I shall mention in its place."

In a most interesting letter to Dubourg written in 1773, Franklin discusses swimming, advocating it warmly, and expressing the opinion that it has the effect of "stopping diarrhea."

"The specific gravity of some human bodies, in comparison to that of water, had been examined by Mr. Robinson, in our *Philosophical Transactions*, Volume L, page 30, for the

year 1757. He asserts, that fat persons with small bones float most easily upon the water.

"The diving-bell is accurately described in our *Transactions*. When I was a boy, I made two oval palettes, each about ten inches long and six broad, with a hole for the thumb, in order to retain it fast in the palm of my hand. They much resembled a painter's palette. In swimming I pushed the edges of these forward, and I struck the water with their flat surfaces as I drew them back. I remember I swam faster by means of these palettes, but they fatigued my wrists. I also fitted to the soles of my feet a kind of sandal; but I was not satisfied with them, because I observed that the stroke is partly given by the inside of the feet and the ankles, and not entirely with the soles of the feet.

"We have here waistcoats for swimming, which are made of double sail-cloth, with small pieces of cork quilted in between them.

"I know nothing of the scaphandre of M. de la Chapelle.

"I know by experience that it is a great comfort to a swimmer, who has a considerable distance to go, to turn himself sometimes on his back, and to vary in other respects the means of procuring a progressive motion.

"When he is seized with the cramp in the leg, the method of driving it away is, to give the parts affected a sudden, vigorous, and violent shock, which he may do in the air as he swims on his back.

"During the great heats of summer there is no danger in bathing, however warm we may be, in rivers which have been thoroughly warmed by the sun. But to throw one's self into cold water, when the body has been heated by exercise in the sun, is an imprudence which may prove fatal. I once knew an instance of four young men, who, having worked at harvest in the heat of the day, with a view of refreshing themselves plunged into a spring of cold water; two died upon the spot, a third in the morning, and the fourth recovered with great difficulty. A copious draught of cold water, in similar circumstances, is frequently attended with the same effect in North America.

"The exercise of swimming is one of the most healthy and agreeable in the world. After having swam for an hour or two in the evening, one sleeps cooly the whole night, even during

the most ardent heat of summer. Perhaps, the pores being cleansed, the insensible perspiration increases and occasions this coolness. It is certain that much swimming is the means of stopping a diarrhea, and even of producing a constipation. With respect to those who do not know how to swim or who are affected with a diarrhea at a season which does not permit them to use that exercise, a warm bath, by cleansing and purifying the skin, is found very salutary, and often effects a radical cure. I speak from my own experience, frequently repeated, and that of others, to whom I have recommended this."

In a letter to Oliver Neave which is rather too long to reproduce, Franklin urges that it is not too late in life for his friend to learn to swim; and then, in considerable detail he lays down rules for beginners in the art of swimming which would be of the greatest practical value were they, without alteration, posted up in swimming schools to-day.

Franklin argues on several occasions that in the case of scarcity of drinking water at sea, that the suffering from thirst may be in some measure relieved by immersing the body in water for some considerable period. In a letter to a young lady, 1769, he remarks:

"I take this Opportunity to send you, also, a late Paper, containing a melancholy Account of the Distresses of some Seamen. You will observe in it the Advantages they receiv'd from wearing their Clothes constantly wet with salt Water, under the total Want of fresh Water to drink. You may remember I recommended this Practice many years ago."

THE VALUE OF FRESH AIR AND PROPER VENTILATION.

The Nature and Contagiousness of "Colds."

Franklin was deeply impressed with the value of fresh air, at a time when it was far too much excluded from dwelling houses, hospitals, and other pubic buildings. He thought upon and investigated the subject much and wrote upon it repeatedly. He devised and described the "Pennsylvania fire-place" which was intended to heat a room equally and secure an even temperature in it. Lord Kaimes, addressing him as a "universal smoke doctor," asked his advice as to the ventilation of his new house in Edinburgh. He was consulted as to the best methods of ventilation for the House of Commons; and

several medical friends asked for suggestions for the ventilation of hospitals. Franklin often twitted his doctor friends on their fear of fresh air, or their tardy recognition of its value. The present open air treatment of tuberculosis patients may be fairly said to be nothing more than a concrete application of the principles for which Franklin stood. Franklin would not allow that fresh air was bad even when damp. Parton remarks:

"He was among the first who called attention to the cruel folly of excluding fresh air from hospitals and sick rooms, particularly those of fever patients. Unquestionably he was the originator of the modern art of ventilation. He cleared the pure air of heaven from calumnious imputation, and threw open the windows to mankind."

In his investigations of the value of fresh air, Franklin gave much consideration to the subject of "colds," "catching colds," etc., and as will be presently seen, he set forth plainly and fully the modern theory of "colds" and the conditions under which they are contagious; and not until one hundred and fifty years later did these views of Franklin become those of the medical profession. They are now accepted everywhere.

Franklin's investigations in the subject of ventilation naturally led him to the careful consideration of and experiments upon chimneys. Smyth remarks:

"Before the time of Franklin's invention, smoky chimneys were among the commonest annoyances of domestic life. A smoky house is mentioned by Shakespeare in the category of tedious things with a tired horse and a railing wife. 'How may a smoky chimney be best cured?' was one of Franklin's queries for the Junto. 'It is strange methinks,' he remarked, 'that though chimneys have been for so long in use, the construction should be so little understood, till lately, that no workman pretended to make one which should always carry off all smoke.' "

The result of Franklin's studies was the invention of the "Pensylvania fire-place," in 1742. Upon this subject he wrote a remarkable essay containing as it does many observations on physics, hygiene, ventilation, and public health. Several passages germane to this study will bear quoting.

While recognizing the improvement which had been made in the construction of chimneys by which the smoke had been eliminated, he observed that they are still quite objectionable

because of the strong drafts at every crevice; and he goes on to say:

"Many colds are caught from this cause only; it being safer to sit in the open street, for then the Pores do all close together, and the Air does not strike so sharply against any particular Part. The Spaniards have a Proverbial Saying,

> "'If the Wind blows on you thro' a Hole,
> Make your Will, and take care of your Soul.'

Women particularly from this Cause, (as they sit much in the House) get Colds in the Head, Rheums, and Defluctions, which fall into their Jaws and Gums, and have destroyed early many a fine set of teeth in these Northern Colonies. Great and bright Fires do also very much contribute to damage the Eyes, dry and shrivel the Skin, and bring on early Appearances of Old-Age. In short, many of the Diseases proceeding from Colds, as Fevers, Pleurisies, etc., fatal to very great Numbers of people, may be ascribed to strongdrawing Chimneys, whereby, in severe Weather, a man is scorched before, while he's froze behind."

Continuing his argument for the advantages of the Pennsylvania fire-place devised by him, he makes the following observations: "That warm rooms make people tender and apt to catch cold, is a mistake as great as it is (among the *English*) general. We have seen in the preceding Pages how the common Rooms are apt to give Colds; but the writer of this Paper may affirm, from his own Experience, and that of his Family and Friends who have used warm Rooms, people are rendered *less liable* to take Cold, and indeed, *actually hardened.* If sitting warm in a Room made One subject to take cold on going out, lying warm in Bed should, by a Parity of Reason, produce the same effect when we rise. Yet we find we can leap out of the warmest Bed naked in the coldest morning, without any Danger; and in the same Manner out of warm Clothes into a cold bed. The Reason is, that in these Cases the Pores all close at once, the Cold is shut out, and the Heat within augmented, as we soon after feel by the glowing of the flesh and skin. Thus no one was ever known to catch Cold by the use of the cold Bath: And are not cold Baths allowed to harden the Bodies of those that use them? Are they not therefore frequently prescribed to the tenderest Constitutions? Now, every Time you go out of a warm Room into a Cold Bath, and the effect is in proportion the same; for (tho' perhaps you may feel somewhat chilly at first)

you find in a little Time your Bodies hardened and strengthened, your Blood is driven with a brisker Circulation, and a Comfortable, steady, uniform inward Warmth succeeds that equal outward Warmth you first received in the room. Farther to confirm this Assertion, we instance the *Swedes,* the *Danes,* the Russians; these Nations are said to live in Rooms, compared to ours, as hot as ovens; yet where are the hardy Soldiers, tho' bred in their boasted cool Houses, that can, like these People, bear the Fatigues of a Winter Campaign in so severe a Climate, march whole Days to the Neck in snow, and at Night entrench in Ice, as they do?" He sums up the advantages of the Pennsylvania fire-place under fifteen heads, of which the following are quoted:

"If you sit near the Fire, you have not that cold draft of uncomfortable Air nipping your Back and Heels, as when before common Fires, by which many catch Cold, being scorcht before, and as it were, froze behind.

"If you sit against a Crevice, there is not that sharp Draught of cold Air playing on you, as in Rooms where there are Fires Coughs, Catarrhs, Tooth-aches, Fevers, Pleurisies, and many other Diseases.

"In Case of Sickness, they make most excellent Nursing-rooms; as they constantly supply a sufficiency of fresh air, so warmed at the same time as to be no way inconvenient or dangerous. A small One does well in a Chamber; and, the Chimney being fitted for it, it may be removed from one room to another, as Occasion requires, and fixed in half an Hour. The equal temper, too, and Warmth, of the Air of the Room, is thought to be particularly advantageous in some Distempers: For 'twas observed in the Winters of 1730 and 1736, when the small-pox spread in *Pennsylvania,* that very few of the Children of the Germans died of that Distemper in proportion to those of the *English;* which was ascribed by some to the warmth and equal Temper of Air in their Stove-Rooms; which made the Disease as favorable as it commonly is in the *West Indies.* But this Conjecture we submit to the judgment of Physicians."

Writing on "The Causes and Cures of Smoky Chimneys," Franklin discusses, in some detail, the subject of ventilation, dampness, fresh air, colds, etc. "Some are as much afraid of fresh Air as persons in the Hydrophobia are of fresh water. I myself had formerly this prejudice, this Aerophobia, as I now

account it; and, dreading the supposed dangerous Effects of cool Air, I considered it as an Enemy, and closed with extreme care every Crevice in the Rooms I inhabited.

"Experience has convinced me of my Error. I now look upon fresh Air as a friend; I even sleep with an open Window. I am persuaded, that no common Air from without is so unwholesome, as the Air within a close Room, that has been often breath'd and not changed. Moist Air, too, which formerly I thought pernicious, gives me no Apprehensions; for considering that no Dampness of Air apply'd to the Outside of my Skin can equal to what is apply'd to and touches it within, my whole Body being full of Moisture, and finding that I can lie two hours in a Bath twice a Week, covered with Water, which certainly is much damper than any Air can be, and this for Years together, without catching Cold, or being in any other manner disordered by it, I no longer dread mere Moisture, either in Air or in Sheets or Shirts: And I find it of no Importance to the Happiness of Life, the being freed from vain Terrors, especially of objects that we are every day exposed inevitably to meet with. You Physicians have of late happily discovered, after a contrary Opinion had prevail'd some Ages, that fresh and cool Air does good to Persons in the Small-Pox and other Fevers. It is to be hoped that in another Century or two we may all find out, that it is not bad even for People in Health. And as to Moist Air, here I am at this present Writing in a Ship with above 40 Persons, who have had no other but moist Air to breathe for 6 Weeks past; every thing we touch is damp, and nothing dries, yet we are all as healthy as we should be on the mountains of Switzerland, whose Inhabitants are not more than those of Bermuda or St. Helena Islands. Islands on whose Rocks the Waves are dashed into Millions of Particles which fill the Air with Damp, but produce no Distemper, the Moisture being pure, unmixed with the poisonous Vapours arising from Marshes and stagnant Pools, in which many Insects die and corrupt the Water. These Places only, in my Opinion (which however I submit to yours), afford unwholesome Air; and that it is not the mere Water contained in Damp Air, but the volatile Particles of corrupted animal Matter mixed with that Water, which renders such Air Pernicious to those who breathe it. And I imagine it a Cause of the same kind that renders the Air in close Rooms, where the perspirable Matter is breathed over and over

again by a number of assembled People, so hurtful to Health. After being in such a Situation, many find themselves affected by that *Febricula,* which the English alone call a *Cold,* and perhaps from the Name, imagine that they caught the malady by going out of the Room, when it was in fact by being in it."

Franklin's study of the subject of ventilation led him to make a number of interesting experiments, one of which is thus noted by Dr. Small, an English surgeon:

"The doctor confirmed this by this following experiment: He breathed gently through a tube into a deep glass mug, so as to impregnate all the air in the mug with this quality. He then put a lighted *bougie* into the mug, and upon touching the air therein the flame was instantly extinguished; by frequently repeating the operation, the *bougie* gradually preserved its light longer in the mug, so as in a short time to retain it to the bottom of it, the air having totally lost the bad quality it had contracted from the breath blown into it."

As has been remarked before, Franklin was on terms of intimate friendship with Joseph Priestley and they exchanged many letters and held many conferences together. Priestley performed some very interesting experiments, causing plants to grow in air which had become vitiated from human expiration. In a letter to Franklin, Priestley informs him of the very flourishing state of plants growing in this vitiated atmosphere. Replying to this letter Franklin writes:

"That the vegetable creation should restore the air which is spoiled by the animal part of it, looks like a rational system and seems to be a piece with the rest. Thus fire purifies water all the world over. It purifies it by distillation when it raises it in vapors and lets it fall in rain; and further still by filtration when, keeping it fluid, it suffers that rain to percolate the earth. We knew before that putrid animal substances were converted into sweet vegetables when mixed with the earth and applied as manure; and now it seems that the same putrid substances, mixed with the air, have a similar effect. The strong thriving state of your mint, in the putrid air, seems to show that the air is mended by taking something from it and not by adding to it. I hope this will give some check to the rage of destroying trees that grow near houses, which has accompanied our late improvements in gardening, from an opinion of their being unwholesome. I am certain, from long observation, that there is nothing unhealthy

in the air of the woods, and no people on earth enjoy better health or are more prolific."

Writing from London on July 28, 1768, to Dr. Dubourg, Franklin describes what he calls a fresh air bath.

"I greatly approve the epithet which you give, in your letter of the 8th of June, to the method of treating the small-pox, which you call the tonic or bracing method; I will take occasion from it to mention a practice to which I have accustomed myself. You know the cold bath has long been in vogue here as a tonic; but the shock of the cold water has always appeared to me, generally speaking, as too violent, and I have found it much more agreeable to my constitution to bathe in another element, I mean cold air. With this view I rise almost every morning and sit in my chamber without any clothes whatever, half an hour or an hour, according to the season, either reading or writing. This practice is not in the least painful but, on the contrary, agreeable; and if I return to bed afterwards before I dress myself, as sometimes happens, I make a supplement to my night's rest of one or two hours of the most pleasing sleep that can be imagined. I find no ill consequences whatever resulting from it and that at least it does not injure my health, if it does not in fact contribute much to its preservation. I shall therefore call it for the future a *bracing* or *tonic* bath."

In a letter to Dr. Hawkesworth, dated London, May 8, 1772, Franklin writes of Prisetley's experiments with Fix'd Air:

"Dr. Priestley discovered that two-fourths of the air, one produced by suffering dead mice to putrefy under glass, the other by the effervescence of chalk and water with a small quantity of acid or vitriol, in either of which living mice being put would instantly die, yet the two being mixed both become good common air, and mice breathe in it freely. From his own and Dr. McBride's Experiments (who thought Fix'd Air would prevent or cure the sea scurvy) he was persuaded it might be of use in mortification. But of this there has been only a single experiment. A Physician of his acquaintance at Leeds wrote to him while he was lately in town that a person dying as was thought of a putrid fever with all the symptoms of a mortification in the bowels had been suddenly relieved and recovered by the injection of Fix'd Air as a clyster. These are all our present premises upon which you can judge as well as I how far one may expect the same Fix'd Air will be of service to a cancer, but, as you

ask my opinion, as the case might be desperate and we know of no danger in the trial, I should be for trying it. I would first syringe the sore strongly with warm water impregnated with Fix'd Air so as to cleanse well the part. Then I would apply to it a succession of glasses filled with Fix'd Air, each glass to remain till the sore had absorbed the Fix'd Air contained in it. It would require a long description to explain the readiest methods of obtaining the air, applying it, and impregnating the water with it, and perhaps I would not make myself clearly understood."

In a letter to Jean Baptiste Le Roy, dated June 22, 1773, Franklin writes of his favorite subject, fresh air, as follows:

"I am pleased to hear you are engaged in the Consideration of Hospitals. I wish any Observations of mine could be of Use to you, they should be at your Service. But 'tis a Subject I am very little acquainted with. I can only say, that, if a free & copious Perspiration is of Use in Diseases, that seems, from the Experiments I mentioned to M. Dubourg, to be best obtained by light covering & fresh Air continually changing: The Moisture on the Skin when the Body is warmly covered, being a Deception and the Effect not of greater Transpiration, but of the Saturation of the Air included under the & in the Bedclothes, which therefore can absorb no more, and so leaves it on the Body. From those Experiments I am convinced of what I indeed before suspected, that the Opinion of Perspiration being checked by Cold is an error, as well as that of Rheum being occasioned by Cold. But as this is Heresy here, and perhaps may be so with you, I only whisper it, and expect you will keep my Secret. Our Physicians have begun to discover that fresh Air is good for People in the Small-Pox and other Fevers, I hope they will find out that it does no harm to People in Health."

Two weeks later, writing to his old friend, Dubourg, he says:

"I have not time now to write what I intend upon the Cause of Colds, or Rheums, and my Opinions on that Head are so singular here, that I am almost afraid to hazard them abroad. In the meantime, be so kind as to tell me at your leisure, whether in France you have a general Belief that moist Air, and damp Shirts or Sheets, and wet Floors and Beds that have not lately been used, and Clothes that have not lately been worn, and going out of a warm Room into the Air, and leaving off a

long-worn waistcoat, and wearing leaky Shoes, and sitting near an open Window, or Door, or in a Coach with both Glasses down, are all or any of them capable of giving the Distemper we call a Cold, and you a *Rheum* or *Catarrh?* Or are these merely *English* ideas?"

In another letter to Dr. Dubourg, Franklin offers some observations on the subject of perspiration, damp clothes, etc.

"I shall not attempt to explain why damp clothes occasion colds, rather than wet ones, because I doubt the fact; I imagine that neither the one nor the other contribute to this effect, and that the cause of colds are totally independent of wet and even cold. I propose writing a short paper on this subject the first moment of leisure I have at my disposal. In the mean time, I can only say that, having some suspicions that the common notion, which attributes to colds the property of stopping the pores and obstructing perspiration, was ill founded, I engaged a young physician, who is making some experiments with Sanctorius's balance, to estimate the different proportions of his perspiration, when remaining one hour naked, and another warmly clothed. He pursued the experiment in this alternate manner for eight hours successively and found his perspiration almost doubled during those hours in which he was naked."

Franklin's view of "colds" and their contagiousness and the advantage of fresh air are perhaps best set forth in a letter to Dr. Benjamin Rush, which he wrote from London June 14, 1773.

"I shall communicate your judicious remark, relating to the septic quality of the air transpired by patients in putrid diseases, to my friend, Dr. Priestley. I hope that after having discovered the benefit of fresh and cool air applied to the sick, people will begin to suspect that possibly it may do no harm to the well. I have not seen Dr. Cullen's book, but am glad to hear that he speaks of catarrhs or colds by contagion. I have long been satisfied from observation, that besides the general colds now termed influenza (which may possibly spread by contagion, as well as by a particular quality of the air), people often catch cold from one another when shut up together in close rooms, coaches, &c., and when sitting near and conversing so as to breathe in each other's transpiration; the disorder being in a certain state. I think too, that it is the frouzy, corrupt air from animal substances, and the perspired matter from our bodies, which being long confined in beds not lately used, and clothes

not lately worn, and books long shut up in close rooms, obtains that kind of putridity, which occasions the colds observed upon sleeping in, wearing, and turning over such bedclothes, or books, and not their coldness or dampness. From these causes, but more from too full living, with too little exercise, proceed in my opinion most of the disorders, which for one hundred and fifty years past the English have called *colds.*

"As to Dr. Cullen's cold or catarrh *a frigore,* I question whether such an one ever existed. Traveling in our severe winters, I have suffered cold sometimes to an extremity only short of freezing, but this did not make me *catch cold.* And, for moisture, I have been in the river two or three hours for a fortnight together, when one would suppose I might imbibe enough of it to *take cold* if humidity could give it; but no such effect ever followed. Boys never get cold by swimming. Nor are people at sea, or who live at Bermuda or St. Helena, small islands where the air must be moist from the dashing and breaking of waves against their rocks on all sides, more subject to colds than those who inhabit part of a continent where the air is driest. Dampness may indeed assist in producing putridity and those miasmata which infect us with the disorder we call a cold; but of itself can never by a little addition of moisture hurt a body filled with watery fluids from head to foot."

Writing to Thomas Percival, London, September 25, 1773, Franklin argues that "moist seasons" are healthiest, and again clearly sets forth his ideas as to the contagiousness of colds.

" 'Tis a curious Remark that moist Seasons are the healthiest. The Gentry of England are remarkably afraid of Moisture, and of Air. But Seamen, who live in perpetually moist Air, are always Healthy, if they have good Provisions. The Inhabitants of Bermuda, St. Helena, and other Islands far from Continents, surrounded with Rocks against which the Waves continually dashing fill the Air with Spray & Vapour, and where no Wind can arrive that does not pass over much Sea, and of course bring much Moisture, these People are remarkably healthy. And I have long thought that mere moist Air has no ill effect on the Constitution; tho' Air impregnated with Vapour from putrid Marshes is found pernicious, not from the Moisture, but the Putridity. It seems strange

that a Man whose Body is composed in great Part of Moist Fluids, whose Blood and Juices are so watery, who can swallow Quantities of Water and Small Beer daily without Inconvenience, should fancy that a little more or less Moisture in the Air should be of such Importance. But we abound in Absurity and Inconsistency.

"Thus tho' it is generally allowed that *taking the Air* is a good Thing, yet what Caution against Air, what stopping of Crevices, what wrapping up in warm Clothes, what shutting of Doors and Windows! even in the midst of Summer! Many London Families go out once a day to take the Air; three or four Persons in a Coach, one perhaps sick; these go three or four Miles, or as many Turns in Hide Park, with the Glasses both up close, all breathing over & over again the same Air they brought out of town with them in the Coach with the least change possible, and rendered worse and worse every moment. And this they call *taking the Air.* From many Year's Observations on myself and others, I am persuaded we are on a wrong scent in supposing Moist or cold Air, the Cause of that Disorder we call *a Cold.* Some unknown Quality in the Air may perhaps produce colds, as in the influenza; but generally I apprehend they are the effect of too full Living in proportion to our Exercise."

Franklin's views on fresh air brought him on one occasion in active conflict with John Adams when the two were compelled to bunk together, in 1776. Adams, in his autobiography says:

"At Brunswick, but one bed could be procured for Dr. Franklin and me, in a chamber little larger than the bed, without a chimney, and with only one small window. The window was open, and I who was an invalid and afraid of the air of night, shut it close. 'Oh!' says Franklin, 'don't shut the window, we shall be suffocated.' I answered I was afraid of the evening air. Dr. Franklin replied, 'The air within this chamber will soon be, and indeed is now, worse than that without doors. Come, open the window and come to bed, and I will convince you. I believe you are not acquainted with my theory of colds?' Opening the window, and leaping into bed, I said I had read his letters to Dr. Cooper, in which he had advanced, that nobody ever got cold by going into a cold church or any other cold air, but the theory was so

little consistent with my experience, that I thought it a paradox. However, I had so much curiosity to hear his reasons that I would run the risk of a cold. The Dr. then began a harangue upon air and cold, and respiration and perspiration, with which I was so much amused that I soon fell asleep, and left him and his philosophy together, but I believe they were equally sound and insensible within a few minutes after me, for the last words I heard were pronounced as he was more than half asleep. I remember little of the lecture, except that the human body, by respiration and perspiration, destroy a gallon of air in a minute; that two such persons as were now in that chamber, would consume all the air in it in an hour or two; that by breathing over again the matter thrown off by the lungs and the skin, we should imbibe the real cause of colds, not from abroad, but from within."

ANATOMY AND PHYSIOLOGY.

In two letters to his friend, Dr. Cadwallader Colden, written in 1745, Franklin discusses the subject of absorption, perspiration, and circulation, at considerable length and after a most interesting fashion.

"I am extremely pleased with your doctrine of the *absorbent vessels* intermixed with the perspiratory ducts, both on the external and internal superficies of the body. After I had read Sanctorius, I imagined a constant stream of the perspirable matter issuing at *every* pore in the skin. But then I was puzzled to account for the effects of mercurial unctions for the strangury, sometimes occasioned by an outward application of the flies, and the like; since whatever virtue or quality might be in a medicine laid upon the skin, if it would enter the body, it must go against wind and tide, as one may say. Dr. Hales helped me a little, when he informed me, in his *Vegetable Statics,* that the body is not always in a perspirable, but sometimes in an *imbibing state,* as he expresses it, and will at times actually grow heavier by being exposed to moist air. But this did not quite remove my difficulty; since, as these fits of imbibing did not appear to be regular or frequent, a blistering plaster might lie on the body a week, or a mercurial ungent be used a month, to no purpose, if the body should so long continue in a perspirable state. Your doctrine, which was quite new to me makes all easy; since the body may

perspire, and absorb at the same time, through the different ducts destined to those different ends.

"I must own, however, that I have one objection to the explanation you give of the operation of these absorbents. That they should communicate with the veins, and the perspirants with the arteries only, seems natural enough; but, as all fluids by the hydrostatical law pass equally in all directions, I question whether the *mere direction* of one of those minute vessels, where it joins with the vein or artery, *with* or *against* the stream of blood in the larger vessel, would be sufficient to produce such contrary effects as *perspiring* and absorbing. If it would, perspirants and absorbents might proceed from the arteries only, or from the veins only, or from both indifferently; as, by the figure in the margin (Fig. 1) whether the vessel a b is an artery or a vein, if the stream moves from a to b, the minute communicating vessel c shall be a perspirant, and d an absorbent; and the contrary, if it moves from b to a. Yet I can not say I am certain the mere direction of the vessel will have no effect; I only suspect it, and am making a little machine to try an experiment with for satisfaction.

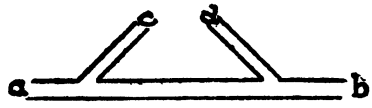

FIG 1.

"It is a siphon made of two large joints of Carolina cane united at e, into which two small glass tubes, f and g, are to be inserted, one on the descending, and the other on the ascending side. (See Fig. 2.) I propose to fill the siphon

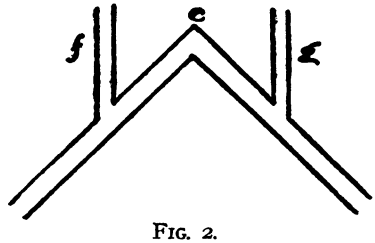

FIG. 2.

and the two glass tubes with water, and, when it is playing, unstop at the same instant the tops of both glass tubes, observing in which the water sinks fastest. You shall know

the success. I conceive the pressure of the atmosphere on the apertures of the two glass tubes to be no way different from the pressure of the same on the mouths of the perspirants and absorbents, and if the water sinks equally in the tubes, notwithstanding the direction of one against the other with the stream, I shall be ready to think we must look out for another solution. You will say, perhaps, that it will then be time enough when the experiment is tried, and succeeds as I suspect, yet I can not forbear attempting at one beforehand, while some thoughts are present in my mind. If a new solution should be found necessary, this may be ready for consideration.

"I do not remember, that any antagonist, that has fallen in my way, has assigned any other cause of the motion of the blood through its whole circle, than the contractile force of the heart, by which that fluid is driven with violence into the arteries, and so continually propelled by repetitions of the same force, till it arrives at the heart again. May we for our present purpose suppose another cause producing half the effect, and say that the ventricles of the heart, like syringes, *draw,* when they dilate, as well as force when they contract? That this is not unlikely, may be judged from the valves nature has placed in the arteries, to prevent the drawing back of the blood in those vessels when the heart dilates, while no such obstacles prevent its sucking (to use the vulgar expression) from the veins. If this be allowed, and the insertion of the absorbents into the veins and of the perspirants into the arteries be agreed to, it will be of no importance in what direction they are inserted. For, as the branches of the arteries are continually lessening in their diameters, and the motion of the blood decreasing by means of the increased resistance, there must, as more is constantly pressed on behind, arise a kind of *crowding* in the extremities of those vessels, which will naturally *force out* what is contained in the perspirants that communicate with them. This lessens the quality of blood, so that the heart can not receive again by the veins all it had discharged into the arteries, which occasions it to draw strongly upon the absorbents that communicate with them. And thus the body is continually perspiring and imbibing. Hence after long fasting the body is more liable to receive infection from bad air, and food, before

it is sufficiently chylified, is drawn crude into the blood by absorbents that open into the bowels.

"To confirm this position, that the heart *draws,* as well as *drives* the blood, let me add this particular. If you sit or lean long, in such a manner as to compress the principle artery that supplies a limb with blood, so that it does not furnish a due quantity, you will be sensible of a pricking pain in the extremities like that of a thousand needles; and the veins, which used to raise your skin in ridges, will be (with the skin) sunk into channels; the blood being drawn out of them, and their sides pressed so closely together that it is with difficulty and slowly that the blood afterwards enters them, when the compressed artery is relieved. If the blood was not drawn by the heart, the compression of an artery would not empty a vein, and I conjecture that the pricking pain is occasioned by the sides of the small vessels being pressed together.

"If there is no contrivance in the frame of the auricles or ventricles of the heart, by which they dilate themselves, I can not conceive how they are dilated. It is said, by the force of the venal blood rushing into them. But if that blood has no force which was not first given to it by the contraction of the heart, how can it (diminished as it must be by the resisting friction of the vessels it has passed through) be strong enough to overcome that contraction? Your doctrine of fermentation in the capillaries helps me a little; for if the returning blood be rarefied by the fermentation, its motion must be increased; but as it seems to me that it must by its expansion resist the arterial blood behind it, as much as it accelerates the venal blood before it, I am still somewhat unsatisfied. I have heard or read somewhere, too, that the hearts of some animals continue to contract and dilate, or to beat, as it is commonly expressed, after they are separated from the other vessels, and taken out of the body. If this be true, their dilation is not caused by the force of the returning blood.

"I should be glad to satisfy myself, too, whether the blood is always quicker in motion, when the pulse beats quicker. Perhaps more blood is driven forward by one strong, deep stroke, than by two that are weak and light; as a man may breathe more by one long common respiration, when in health, than by two quick, short ones in a fever. I applied the siphon

I mentioned to you in a former letter to a pipe of a water-engine. E is the engine; a, its pipe, bbb, the siphon; c and d, the two glass pipes communicating with the siphon (Fig. 3). Upon working the engine, the water flowed through the siphon, and the glass tube c; but none was discharged through d. When I stopped with my finger the end of the siphon, the water issued at both glass tubes, with equal force, and on only half stopping the end of the siphon, it did the same. I imagine the sudden bending of the siphon gives such a resistance to the stream, as to occasion its issuing out of the glass tube c. But I intend to try a further experiment, of which I shall give you an account."

In another piece, of unknown date, under the title of "A Conjecture As To The Cause Of The Heat Of The Blood In Health, And Of The Cold And Hot Fits Of Some Fevers," Franklin continues his discussion of the subject of anatomy and physiology:

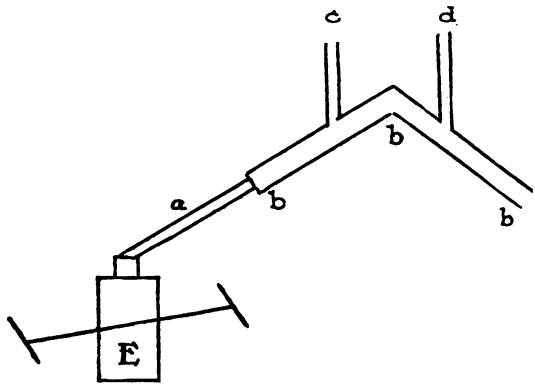

FIG. 3.

"The parts of fluids are so smooth, and roll among one another with so little friction, that they will not by any (mechanical) agitation grow warmer. A phial half full of water shook with violence and long continued, the water neither heats itself nor warms the phial. Therefore the blood does not acquire its heat either from the motion and friction of its own parts, or its friction against the sides of its vessels.

"But the parts of solids, by reason of their closer adhesions can not move among themselves without friction, and that produces heat. Thus, bend a plummet to and fro, and, in the place of bending, it shall soon grow hot. Friction on any part

of our flesh heats it. Clapping of the hands warms them. Exercise warms the whole body.

"The heart is a thick muscle, continually contracting and dilating near eighty times a minute. By this motion there must be a constant interfriction of its constituent solid parts. That friction must produce a heat, and that heat must consequently be continually communicated to the perfluent blood.

"To this may be added, that every propulsion of the blood by the contraction of the heart, distends the arteries, which contract again in the intermission and this distension and contraction of the arteries may occasion heat in them, which they likewise communicate to the blood that flows through them.

"That these causes of the heat of the blood are sufficient to produce the effect, may appear probable, if we consider that a fluid once warm requires no more heat to be applied to it in any part of time to keep it warm, than what it shall lose in an equal part of time. A smaller force will keep a pendulum going, than what first set it in motion.

"The blood, thus warmed in the heart, carries warmth with it to the very extremities of the body, and communicates it to them; but as by this means its heat is gradually diminished, it is returned again to the heart by the veins for a fresh calefaction.

"The blood communicates its heat, not only to the solids of our body, but to our clothes, and to a portion of the circumambient air. Every breath, though drawn in cold, is expired warm; and every particle of the *materia perspirabilis* carries off with it a portion of heat.

"While the blood retains a due fluidity, it passes freely through the minutest vessels, and communicates a proper warmth to the extremities of the body. But when by any means it becomes viscid, as not to be capable of passing those minute vessels, the extremities, as the blood can bring no more heat to them, grow cold.

"The same viscidity in the blood and juices checks or stops the perspiration, by clogging the perspiratory ducts, or, perhaps, by not admitting the perspirable parts to separate. Paper wet with size and water will not dry so soon as if wet with water only.

"A vessel of hot water, if the vapor can freely pass from it, soon cools. If there be just fire enough under it to add continually the heat it loses, it retains the same degree. If

the vessel be closed so that the heat may be retained, there will from the same fire be a continual accession of heat to the water, till it rises to a great degree. Or, if no fire be under it, it will retain the heat it first had for a long time. I have experienced, that a bottle of hot water stopped, and put in my bed at night, has retained so much heat seven or eight hours, that I could not in the morning bear my foot against it, without some of the bedclothes intervening.

"During the cold fit, then, perspiration being stopped, a great part of the heat of the blood, that used to be dissipated, is confined and retained in the body; the heart continues its motion, and creates a constant accession to that heat; the inward parts grow very hot, and, by contact with the extremities, communicate that heat to them. The glue of the blood is by this heat dissolved, and the blood afterwards flows freely, as before the disorder."

On one occasion he wrote to his friend, Dr. Ingenhouz: "To inquisitive minds like yours and mine the reflection that the quantity of human knowledge bears no proportion to the quantity of human ignorance must be in one view rather pleasing, *viz.*, that though we are to live forever we may be continually amused and delighted with learning something new." He discussed with Dubourg the question of life and death. He related to his friend that on one occasion he had received a bottle of Madeira from America; and that upon opening it three flies fell into the first glass that was filled. He goes on to say: "Having heard it remarked that drowned flies were capable of being revived by the rays of the sun, I proposed making an experiment upon these; they were therefore exposed to the sun upon a sieve which had been employed to strain them out of the wine. In less than three hours two of them began by degrees to recover life. They commenced by some convulsive motions of the thighs, and at length they raised themselves upon their legs, wiped their eyes with their forefeet, beat and brushed their wings with their hind feet, and soon after began to fly, finding themselves in Old England, without knowing how they came thither. The third continued lifeless till sunset, when, losing all hopes of him, he was thrown away."

"I wish it were possible, from this instance, to invent a method of embalming drowned persons, in such a manner that they may be recalled to life at any period, however distant;

for having a very ardent desire to see and observe the state of America a hundred years hence, I should prefer to any ordinary death, the being immersed in a cask of Maderia wine, with a few friends, till that time, to be then recalled to life by the solar warmth of my dear country."

Commenting on the above Smyth remarked: "Had his eyes opened after a century's slumber, upon what a world would their calm gaze have rested! The vast images that he saw in glimmering dawn become now the commonplaces of school boys. His daring prophecies of the possibilities of electricity more than fulfilled. A great and proud people, justifying his unfaltering faith in popular instincts and institutions, holding in grateful and perpetual memory his lifelong labours and sacrifices!"

BI-FOCAL SPECTACLES.

For the invention of the bi-focal glass we are indebted to Franklin. When Dollond, the celebrated optician, learned of Franklin's invention, he supposed that the device would be suitable only for particular eyes. Writing to Whatley on this subject Franklin observes:

"By Mr. Dollond's saying that my double spectacles can only serve particular eyes, I doubt he has not been rightly informed of their construction. I imagine it will be found pretty generally true, that the same convexity of glass through which a man sees clearest and best at the distance proper for reading is not the best for greater distances. I therefore had formerly two pair of spectacles which I shifted occasionally, as in travelling I sometimes read, and often wanted to regard the prospects. Finding this change troublesome, and not always sufficiently ready, I had the glasses cut and half of each kind associated in the same circle. By this means as I wear my spectacles constantly, I have only to move my eyes up or down, as I want to see distinctly far or near, the proper glass being always ready. This I find more particularly convenient since my being in France, the glasses that serve me best at table to see what I eat, not being the best to see the faces of those on the other side of the table who speak to me; and when one's ears are not well accustomed to the sounds of a language, a sight of the movements in the features of him that speaks helps to explain; so that I understand French better by the help of my spectacles."

A FLEXIBLE CATHETER.

The following letter, by Franklin, in the possession of Dr. F. N. Otis, of New York, on the subject of flexible catheters, is of peculiar interest for the physician:

"DEAR BROTHER: Reflecting yesterday on your desire to have a flexible catheter, a thought struck into my mind, how one might probably be made; and lest you should not readily conceive it by any description of mine, I went immediately to the silver-smith's and gave directions for making one (sitting by till it was finished) that it might be ready for this post. But now it is done I have some apprehensions that it may be too large to be easy; if so a silver-smith can easily make it less by twisting or turning it on a smaller wire, and putting a smaller pipe to the end, if the pipe is really necessary. This machine may either be covered with small fine gut, first cleaned and soaked a night in a solution of alum and salt and water, then rubbed dry, which will preserve it longer from putrefaction; then wet again and drawn on and tied to the pipes at each end, where little hollows are made for the thread to bind in and the surface greased. Or perhaps it may be used without the gut, having only a little tallow rubbed over it, to smooth it and fill the joints. I think it is as flexible as would be expected in a thing of the kind, and I imagine will readily comply with the turns of the passage, yet has stiffness enough to be protruded; if not, the enclosed wire may be used to stiffen the hinder part of the pipe while the fore part is pushed forward, and as it proceeds the wire may be gradually withdrawn. The tube is of such a nature, that when you have occasion to withdraw it its diameter will lessen, whereby it will move more easily. It is a kind of screw and may be both withdrawn and introduced by turning. Experience is necessary for the right using of all new tools or instruments, and that will perhaps suggest some improvement to this instrument as well as better direct the manner of using it."

POKE-WEED IN THE TREATMENT OF CANCER.

To Dr. Cadwallader Colden, Franklin wrote on April 23, 1752:

"I am heartily glad to hear more instances of the success of the Poke-weed, in the Cure of that horrible Evil to the human Body, a Cancer. You will deserve highly of Mankind for the Communication. But I find in Boston they are at a loss to know the right Plant, some asserting it is what they call *mechoacan*,

others other Things. In one of their late Papers it is publickly requested, that a perfect Description may be given of the Plant, its Places of Growth, etc. I have mislaid the Paper, or would send it to you. I tho't you had described it pretty fully. With great Respect and Esteem, etc.

B. FRANKLIN."

In a letter to Dr. Dubourg, dated March 27, 1773, Franklin writes:

"I apprehend that our poke-weed is what botanists term phytolacca. This plant bears berries as large as peas; the skin is black, but it contains a crimson juice. It is this juice, thickened by evaporation in the sun, which was employed. It caused great pain, but some persons were said to have been cured. I am not quite certain of the facts; all that I know is, that Dr. Colden had a good opinion of the remedy."

STATIC ELECTRICITY AS A REMEDY FOR THE RELIEF OF PARALYSIS.

Franklin wrote a most interesting letter to his old friend, Sir John Pringle, on this subject, from which the physician may draw several important lessons:

"SIR—In compliance with your request, I send you the following account of what I can recollect relating to the effects of electricity in paralytic cases, which have fallen under my observation.

"Some years since, when the newspapers made mention of great cures performed in *Italy* and *Germany*, by means of electricity, a number of paralytics were brought to me from different parts of Pennsylvania, and the neighboring provinces, to be electrised, which I did for them at their request. My method was, to place the patient first in a chair, on an electric stool, and draw a number of strong sparks from all parts of the affected limb or side. Then I fully charged two six gallon glass jars, each of which had about three square feet of surface coated; and I sent the united shock of these through the affected limb or limbs, repeating the stroke commonly three times each day. The first thing observed, was an immediate greater sensible warmth in the lame limbs that had received the stroke, than in the others; and the next morning the patients usually related that they had in the night felt a pricking sensation in the flesh of the paralytic limbs; and would sometimes shew a number of small red spots, which they supposed were occasioned by those

prickings. The limbs, too, were found more capable of voluntary motion and seemed to receive strength. A man, for instance, who could not the first day lift the lame hand from off his knee, would the next day raise it four or five inches, the third day higher; and on the fifth day was able, but with a feeble languid motion, to take off his hat. These appearance gave great spirits to the patients, and made them hope a perfect cure; but I do not remember that I ever saw any amendment after the fifth day; which the patients perceiving, and finding the shock pretty severe, they became discouraged, went home, and in a short time relapsed; so that I never knew any advantage from electricity in palsies that was permanent. And how far the apparent temporary advantage might arise from the exercise in the patient's journey, and coming daily to my house, or from the spirits given by the hope of success, enabling them to exert more strength in moving their limbs, I will not pretend to say.

"Perhaps some permanent advantage might have been obtained, if the electric shocks had been accompanied with proper medicine and regimen, under the direction of a skillful physician. It may be, too, that a few great strokes, as given in my method, may not be so proper as many small ones; since, by the account from *Scotland* of a case, in which two hundred shocks from a phial were given daily, it seems that a permanent cure has been made. As to any uncommon strength supposed to be in the machine used in that case, I imagine it could have no share in the effect produced; since the strength of the shock from charged glass is in proportion to the quantity of surface of glass coated; so that my shocks from those large jars must have been much greater than any that could be received from a phial held in the hand. I am, with great respect, Sir,

"Your most obedient servant,

"B. FRANKLIN."

How many physicians of the present day employing a new or novel remedy observe the caution shown by Franklin in this letter? The "spirit given by the hope of success" if recognized by physicians as well as it was by Franklin would save us from many therapeutic follies. The calm, judicious manner in which Franklin gives his account of these electric experiments might well serve as an admirable pattern for the medical essayist of to-day.

(*To be Concluded.*)